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Lower limb and abdominal compression in the management of orthostatic hypotension

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Dear Editor,

Orthostatic hypotension (OH) is common, affecting 30% of community-dwelling older people and 70% in long-term care [1]. At present, therapeutic options are limited for people with OH. Non-pharmacological strategies include water, precipitant avoidance, raising the head of the bed and lower limb or abdominal compression. Indeed, lower limb and abdominal compression has been recommended by international guidelines [2]. Our experience is that most people do not tolerate lower limb/abdominal compression because they are uncomfortable, difficult to apply and unappealing to look at. We performed a systematic review of the literature to evaluate the quality of the evidence behind lower-limb and abdominal compression and assess its relevance for the rapidly expanding older population.

We searched Ovid (Medline) for English articles from 1946 to October 2013. The search terms were *orthostatic hypotension*, *compression bandages*, *compression stockings* and *abdominal binder*. We also searched reference lists of the search-generated articles for relevant publications. Both authors reviewed all articles independently using pre-defined criteria to select relevant studies. There were no disagreements about including/excluding identified papers. We identified 7 relevant studies and excluded 2 (one was performed in children and used a custom made inflatable device and one was performed in healthy young volunteers assessing vasovagal reactions). None of the 5 remaining studies met predefined criteria for research quality, precluding a systematic review and as

there were no randomised, controlled trials and methodologies were varied, a meta-analysis was not possible. The study details are summarised in Table 1.

The cohorts studied were small, from 9 to 61 participants with none providing a sample size calculation. No study excluded older people and 3 focussed on older people alone. Cohort characteristics were noticeably different, one study focussed on delayed OH, two on autonomic neuropathy, one on hospitalised older people with decompensated heart failure and one on in-patient older people requiring bed rest. Studies A, C and D used continuous, non-invasive BP recording, the remaining used intermittent BP measurement. Various methods were used to assess BP response; these are described in Table 1. Lying-to-sitting and the use of glyceryl trinitrate are considered inadequate methods. Study A, B and E used compression bandages; study C used an abdominal binder and study D used an external compression suit. Pressures generated from the different methods varied from 15 mmHg to 60 mmHg, where reported. Various outcome measures used, these are detailed in Table 1. Where symptoms were reported they were assessed by unvalidated methods. All studies assessed orthostatic BP response in a single observation, with study A also assessing symptoms after 1 month of use of compression bandages.

In the three studies which assessed symptoms (A, B, D), 2 report a statistically significant reduction in symptoms during testing with compression bandages with the other reporting an increasing improvement in symptoms with different levels of external compression. Of the 2 studies which used the lying-to-sitting method, one found a decrease in the prevalence of OH with compression

whereas the other did not. Study B did not report change in BP, the other 4 all reported either a significant reduction in the BP drop or a significant increase in BP with compression. Study A, which reported symptoms after one month of lower-limb compression found a significant reduction in symptoms and a compliance rate of 71%.

Although the aim was to perform a systematic review and meta-analysis of the use of lower limb compression in the treatment of OH, it was not possible due to the quantity and the quality of the studies available. Unfortunately the focus of the studies was observational, using compression during a single orthostatic challenge. Only one study assessed their effects beyond a single episode but this was not controlled, randomised or blinded. While these studies are relatively small and have significant weaknesses they do provide a small degree of support for the use of lower limb compression. However, the evidence is weak and is more supportive for investigating their use further, rather than in support of a clinical intervention.

Lower limb/abdominal compression is arguably not a simple intervention. It is time consuming and difficult to fit, indeed many older people would struggle to use these. If we are to recommend such measures for older people in the treatment of OH we should be basing these recommendations on good evidence. A clinical trial of the use of compression to treat OH would be timely now; the prevalence of OH is increasing and the results would be far reaching.

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Table 1. Description of the studies identified and included in this review.

Study	Cohort	Intervention	Effect
A [3]	21 older people with delayed OH	1. Single blinded, cross-over observation of sham compression or lower limb & abdominal compression 2. 1 month follow up of symptoms using compression	1. Compression significantly reduced BP drop on tilt-test 2. Symptom score at 1 month improved significantly
B [4]	61 inpatients aged >65 years with OH on lying to sitting	Following 36 hours bed rest, participants were randomised to lower limb compression or no compression, with crossover 24 hours later.	1. Prevalence of OH equal in both groups 2. Symptoms significantly less with compression
C [5]	9 people with autonomic dysfunction, aged 35-79	Randomised, crossover study using abdominal compression or no compressios	Standing BP increased significantly with compression at 3 minutes
D [6]	14 people with autonomic neuropathy	External pressure suit, inflated at different sites in random order, each during a tilt-test	1. BP increased most significantly with all sites compressed but not with lower limb

	aged 31-78		compression 2. Symptoms improved with compression at all sites, most when all sites compressed
E [7]	53 inpatients with heart failure & lying to sitting OH aged >60	Lying-to-sitting BP assessed on day 1, compared to lying-to-sitting BP on day 2 with lower limb compression	BP drop decreased significantly with compression

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None

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JF: Concept and design, independent article revie and principle author

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